REMARKS/ARGUMENTS

In the Claims:

Claims 1-51 remain pending in the present application. Claims 1, 8, 22-24 and 28 have been amended.

Rejection of Claims 8, 9, 22, 23 and 24-51 Under 35 U.S.C. § 112

The Examiner objected to claims 8, 9, 22, 23 and 24-51 under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, the Examiner asserts that it is unclear what is encompassed by the device for creating a mixture of adhesion promoter and de-ionized as recited in claim 24. The Examiner further asserts that the terms "said supply device" in claim 8, "said heat exchanger" in claim 22, "said heat exchanger" in claim 23 and "said storage device" in claim 28, all lack proper antecedent basis.

Applicant has amended claims 8 and 22-24 to more clearly describe the subject matter recited therein. As a result of these amendments, Applicant respectfully submits that the Examiner's rejection of claims 8, 9, 22, 23 and 24-51 under 35 U.S.C. § 112 is now moot.

Rejection of Claims 24-27 and 37-39 Under 35 U.S.C. § 102(b)

The Examiner rejected claims 24-27 and 37-39 under 35 U.S.C. § 102(b) as being anticipated by Cuellar et al. (US 5,482,745). As Applicant does not believe Cuellar et al. to teach the subject matter of claims 24-27 and 37-39, the rejection is respectfully traversed.

The present invention is directed to a system for improving the adhesion between the surface of a thermoplastic polyolefin element (plastic element) and a coating

material, namely paint, applied thereto. The system of the present invention operates to apply an adhesion promoter mixture to the plastic element, and to subsequently dry the plastic element so that a dried layer of adhesion promoter remains coated thereto. Consequently, as is well known and would be understood by one skilled in the art, any defects (e.g., runs, sags, streaks, etc.) in the dried layer of adhesion promoter will manifest themselves in the subsequently applied paint coat. This is also true of primer coatings and virtually any other materials that might be applied to an object prior to a paint coat. As such, it is of great importance that the system of the present invention be applied in a manner that minimizes or, more preferably, eliminates, defects in the resulting dried layer of adhesion promoter.

The system of the present invention employs various devices to minimize or eliminate defects in the dried adhesion promoter layer including, for example: an application enclosure having a controlled atmosphere within which the mixture can be applied to the plastic element; a cooling means to cool the plastic element to approximately the temperature within the application enclosure; a regulating means to regulate one or more of a flow rate of the mixture; spray nozzles for applying the mixture that have a particular discharge pattern and angle, and are set at a predetermined distance from, and/or the orientation to, the plastic element; a gravity tank to deliver the mixture to the spray nozzles; and a controlled drying enclosure for drying the mixture-covered plastic element. While the system of the present invention helps to ensure that the entirety of the plastic element gets substantially coated with the mixture, it also operates to minimize agitation of the mixture as the mixture is delivered to the application device and as it subsequently contacts the plastic element. Use of the system of the

present invention results in a plastic element that is thoroughly covered by a dried adhesion promoter layer with minimal or no defects that can be transferred to the subsequently applied paint coat.

Additionally, the system of the present invention preferably applies the adhesion promoter to the plastic element via one or more nozzles that allow the adhesion promoter to be dispensed at a relatively high flow rate. As opposed to being atomized and sprayed onto the plastic element like a typical paint or primer material, the system of the present invention dispenses the adhesion promoter from the nozzle(s) in a manner that cause it to flow over the surfaces of the plastic element upon contact therewith. This technique has been found to best produce an acceptable adhesion promoter layer after drying of the plastic element. For example, each nozzle may be designed to provide a flow rate of adhesion promoter therethrough of between approximately 0.5-2.5 liters per minute - which flow rate is significantly higher than that of conventional spraying methods (see e.g., paragraphs 037-038 and 042-043).

Cuellar et al. makes no mention of an adhesion promoter, or an adhesion promoter/de-ionized water mixture. Hence, Cuellar et al. also fails to teach the use of a device for mixing an adhesion promoter with de-ionized water.

Cuellar et al. also fails to teach a system for applying an adhesion promoter like that taught by the present invention. Rather, Cuellar et al. teaches only a spray coating process and apparatus wherein a spray coating operation takes place in a closed coating chamber. Cuellar et al. states that a spray nozzle tip is used to *atomize* the coating material at a predetermined pressure (e.g., 600 psi), and to apply the coating material to the components in atomized form (see column 5, ll. 42-48). Thus, the actual coating

material application process taught by Cuellar et al. is a typical painting process, and Cuellar et al. does not teach or suggest a system by which a supply of an adhesion promoter mixture is flowed over a plastic element at a high flow rate while creating minimal or no defects in a dried adhesion promoter layer that remains on the plastic element. As such, Applicant respectfully submits that Cuellar et al. cannot support a rejection of claims 24-27 and 37-39 under 35 U.S.C. § 102(b).

Rejection of Claim 44 Under 35 U.S.C. § 103(a)

The Examiner rejected claim 44 under 35 U.S.C. § 103(a) as being unpatentable over Cuellar et al. in view of Bartow (US 5,230,739). Applicant has amended independent claim 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claim 24 to now recite allowable subject matter, claim 44, which depends therefrom, would also be allowable.

Rejection of Claims 44-47 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 44-47 under 35 U.S.C. § 103(a) as being unpatentable over Cuellar et al. in view of Johnson (US 3,559,619). Applicant has amended independent claim 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claim 24 to now recite allowable subject matter, claims 44-47, which depend therefrom, would also be allowable.

Rejection of Claims 50 and 51 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 50 and 51 under 35 U.S.C. § 103(a) as being unpatentable over Cuellar et al. in view of Bradshaw (US 4,367,787). Applicant has

amended independent claim 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claim 24 to now recite allowable subject matter, claims 50 and 51, which depend therefrom, would also be allowable.

Rejection of Claims 1, 3-11, 14, 17, 20, 24-26, 28-30, 33, 34, 37-44 and 48 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1, 3-11, 14, 17, 20, 24-26, 28-30, 33, 34, 37-44 and 48 under 35 U.S.C. § 103(a) as being unpatentable over Kato et al. (US 5,863,333) in view of Ogisu et al. (US 5,534,297). As Applicant does not believe Kato et al. in view of Ogisu et al. to teach the subject matter of claims 1, 3-11, 14, 17, 20, 24-26, 28-30, 33, 34, 37-44 and 48, the rejection is respectfully traversed.

Kato et al. does not teach or suggest the system of the present invention. The apparatus of Kato et al. does not teach or suggest a system for applying an adhesion promoter in a manner that minimizes or eliminates defects in a dried layer of the adhesion promoter that remains on the element to which the adhesion promoter is applied. Rather, the apparatus of Kato et al. is designed only to apply an amount of an ozone-containing aqueous solution to a polyolefin resin molded product, whereby an oxidation reaction on the product's surface will be encouraged. Kato et al. is only concerned with making sure that all portions of the molded product are fully covered with the ozone-containing aqueous solution so that the whole surface of the product can be oxidized and polarized by the oxidizing power of the ozone. (See column 8, lines 55-58).

Kato et al. does not teach or suggest an apparatus designed to uniformly apply an adhesion promoter to a TPO element, whereby a layer of the adhesion promoter will

remain on the element after application, and where defects in the remaining layer of adhesion promoter must be minimized or eliminated. In fact, Kato et al. teaches that the ozone-containing aqueous solution applied to the resin molded product is to be rinsed off after application thereto. In Kato et al., the product enters a surface modifying chamber, where it is inundated with the ozone-containing aqueous solution delivered by a plurality of shower heads. The ozone-containing aqueous solution is delivered to the product in several stages to encourage an oxidation reaction on the surface thereof. (See column 7, line 1 to column 8, line 2). Upon leaving the surface modifying chamber, the product is moved into a rinsing chamber, where the ozone-containing aqueous solution is washed from the product by a supply of purified water. (See column 8, lines 12-22). Finally, the product is moved into a surface conditioning chamber, where it is further rinsed with surface conditioning water that helps the product to shed water remaining thereon prior to entering a dryer. (See column 8, lines 23-36). Thus, after the ozone-containing aqueous solution is applied to the product by the apparatus of Kato et al., it is rinsed therefrom in not one, but two, rinsing steps. Consequently, there can be none of the ozone-containing aqueous solution remaining on the product at the time the product enters the oven. This is acceptable in Kato et al. because adhesion is improved according thereto, by an oxidation reaction on the surface of the product that results from its contact with ozone. Adhesion is not improved by depositing a permanent layer of adhesion promoter on the surface of the product, as is practiced in Applicant's invention.

In contrast to the teachings of Kato et al., after adhesion promoter is applied to the element in the present invention, the element is directed through an oven to dry the

remaining layer of adhesion promoter onto the surface thereof. Thus, a thin layer of adhesion promoter will be existent on the surface of the element when the element receives a subsequent paint coat. Consequently, defects in the adhesion promoter layer can produce corresponding defects in the paint coat that is thereafter applied to the element. For example, runs or sags in the adhesion promoter layer can result in the appearance of corresponding runs or sags in the subsequent paint coat applied to the element. It has been found that various application parameters can lead to such defects including, but not limited to, foaming of the adhesion promoter in the storage tank, the distribution patterns of the adhesion promoter application nozzles, the flow rate of the adhesion promoter, and foaming and splashing produced during application of the adhesion promoter to the element. Therefore, the system of the present invention is designed to minimize or eliminate such defects.

As can be seen by reference to the written specification and drawings of the present application, the present invention goes to great lengths to minimize or eliminate defects in the layer of adhesion promoter left on the elements. The environment of the various sections of the adhesion promoter application system are preferably carefully controlled. A gravity tank may be used to minimize foaming of the stored adhesion promoter. The flow rate of the adhesion promoter through the application nozzles and the location and angle of the nozzles with respect to the element are preferably adjustable and maintained within a predetermined range. Even the speed and angle of the element as it passes beneath the nozzles may be adjusted to best ensure that the element will be provided with a uniform coating of adhesion promoter, and that defects in the coating will be minimized or eliminated.

To this end, for example, the present invention teaches that the location and orientation of the spray nozzles should preferably be set between a predetermined range of values, and that it can be advantageous to angle the spray nozzles toward the direction of travel of the element. It is also possible to angle the element away from the spray nozzles (preferably in the direction of travel) to further reduce defects. The use of such an adhesion promoter application system has been found to minimize defects in the layer of adhesion promoter deposited on the element, such as, for example, by minimizing the splashing and foaming of the adhesion promoter that would typically occur upon its contact with the element.

Kato et al. does not teach or suggest such a system, because the apparatus of Kato et al. is not designed to deposit a permanent layer of adhesion promoter on the product. Thus, Kato et al. need not be concerned with splashing, foaming, and many of the other adhesion promoter application factors that can cause such defects. For example, in Kato et al. it is shown to use opposing nozzles to apply the ozone-containing aqueous solution to a substantially upright resin molded product. While such an application method likely leads to full coverage of the element, it would also lead to excessive splashing, foaming, etc. - exactly what the system of the present invention is designed to avoid.

Likewise, control of the environment (e.g., temperature, humidity, etc.) within the various sections of the adhesion promoter application system of the present invention is more critical than in Kato et al. Because a layer of adhesion promoter must remain on the element in the present invention, the environment must be controlled in a manner

that best allows the adhesion promoter layer to be formed and dried. This is not the case in Kato et al.

Combining Kato et al. with Ogisu et al. does not overcome the deficiencies of Kato et al.'s teachings. Like Kato et al., Ogisu et al. is concerned with applying an aqueous ozone solution to the surface of resin molded articles. Ogisu et al. shows that the solution may be sprayed onto the articles via shower head like nozzles, or may be overflowed onto underlying articles from an overhead trough. Also like Kato et al., Ogisu et al. is only concerned with ensuring that the entire article gets covered with the ozone solution. Because the system and method of Ogisu et al. does not involve the deposition of a permanent adhesion promoter layer onto the surface of such an article, application conditions such as foaming and splashing that are of significant concern in the present invention, are of no concern in Ogisu et al. This appears to be especially obvious in light of the two exemplary application methods that are shown in the drawing figures, and mentioned above.

Therefore, as can be seen from the foregoing discussion, Kato et al. in view of Ogisu et al. does not teach or suggest the subject matter of the rejected claims. As such, Applicant respectfully submits that Kato et al. in view of Ogisu et al. cannot support a rejection of claims 1, 3-11, 14, 17, 20, 24-26, 28-30, 33, 34, 37-44 and 48 under 35 U.S.C. § 103(a).

Rejection of Claims 12, 13, 27 and 45 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 12, 13, 27 and 45 under 35 U.S.C. § 103(a) as being unpatentable over as being unpatentable over Kato et al. in view of Ogisu et al.

and Mashima et al. (US 5,919,288). Applicant has amended independent claims 1 and 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claims 1 and 24 to now recite allowable subject matter, claims 12, 13, 27 and 45, which depend therefrom, would also be allowable.

Rejection of Claims 15, 16, 18, 19, 31, 32, 35 and 36 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 15, 16, 18, 19, 31, 32, 35 and 36 under 35 U.S.C. § 103(a) as being unpatentable over as being unpatentable over Kato et al. in view of Ogisu et al. and Ankrett (US 4,600,608). Applicant has amended independent claims 1 and 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claims 1 and 24 to now recite allowable subject matter, claims 15, 16, 18, 19, 31, 32, 35 and 36, which depend therefrom, would also be allowable.

Rejection of Claims 22, 23, 46, 47, 50 and 51 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 22, 23, 46, 47, 50 and 51 under 35 U.S.C. § 103(a) as being unpatentable over as being unpatentable over Kato et al. in view of Ogisu et al. and Bradshaw. Applicant has amended independent claims 1 and 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claims 1 and 24 to now recite allowable subject matter, claims 22, 23, 46, 47, 50 and 51, which depend therefrom, would also be allowable.

Rejection of Claims 21 and 49 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 21 and 49 under 35 U.S.C. § 103(a) as being unpatentable over as being unpatentable over Kato et al. in view of Ogisu et al. and

Browning[1]. Applicant has amended independent claims 1 and 24 to more clearly describe the subject matter recited therein. As Applicant believes independent claims 1 and 24 to now recite allowable subject matter, claims 21 and 49, which depend therefrom, would also be allowable.

Rejection of Claim 2 Under 35 U.S.C. § 103(a)

The Examiner rejected claim 2 under 35 U.S.C. § 103(a) as being unpatentable over as being unpatentable over Kato et al. in view of Ogisu et al. and Kawano et al. (US 6,262,160). Applicant has amended independent claim 1 to more clearly describe the subject matter recited therein. As Applicant believes independent claim 1 to now recite allowable subject matter, claim 2, which depend therefrom, would also be allowable.

CONCLUSION

Applicant has amended claims 1, 8, 22-24 and 28 to more clearly describe the subject matter recited therein. The language of the present claims now comports more closely with the claim language of US Patent No. 6,875,472, which was previously granted by this Office. Applicant has also distinguished the subject matter of the present invention over the teachings of the references cited as prior art by the Examiner.

Therefore, Applicant respectfully submits that the present application is now in condition for allowance, and such action is earnestly requested. Telephone inquiry to

[1] Applicant is unsure of the U.S. patent number for the Browning reference cited by the Examiner.

the undersigned in order to clarify or otherwise expedite prosecution of the present application is respectfully encouraged.

Respectfully submitted,

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